

U.S. Patent Application Serial No. 10/009,337
Reply to Office Action dated August 26, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Claims 1-3, 5-7, and 9-11 are amended.

Listing of Claims:

1. (Currently Amended) Device for mode-locking laser, in particular a laser of pulsed type, comprising a resonant cavity [(20)],

- delimited by a first mirror [(1)] and a second mirror [(8)],

- provided with an active laser gain medium [(5)] for amplifying a laser radiation beam at the fundamental frequency $[(\omega_1)]$, and

- with a solid non-linear optical means [(10)] which comprises at least said second mirror [(8)], for reversible conversion of the radiation at the fundamental frequency $[(\omega_1)]$ into radiation at a harmonic frequency $[(\omega_2)]$, said non-linear optical means having a reflection coefficient which increases as the intensity of the radiation at the fundamental frequency increases,

said device further comprising arranged in the resonant cavity (20) a solid intensity limiter [(4)], arranged in the resonant cavity, whose transmission coefficient of the laser radiation passively decreases as the intensity of said radiation increases, wherein characterized in that said intensity limiter [(4)] comprises GaAs, CdSe or InP plate.

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2. (Currently Amended) Device according to claim 1, characterized in that the non-linear optical means [[(10)]] ~~comprises said second mirror (8)~~ which corresponds to a dichroic mirror and a non-linear crystal [[(7)]] able to convert the radiation at the fundamental frequency into radiation at a harmonic frequency.
3. (Currently Amended) Device according to claim 1, characterized in that the non-linear optical means [[(10)]] comprises said second mirror [[(8)]] which corresponds to a dichroic mirror, a non-linear crystal [[(7)]] able to convert the radiation at the fundamental frequency into radiation at a harmonic frequency, and at least one component for polarization selection and/or modification.
4. (Previously Presented) Device according to Claim 2, characterized in that said non-linear crystal is a BBO crystal.
5. (Currently Amended) Device according to one of claim 1, characterized in that the non-linear optical means [[(10)]] comprises only the second mirror [[(8)]], wherein said second mirror ~~corresponding~~ corresponds to a Fabry-Perot anti-resonant saturable absorber constructed from a superposition of dielectric or metallic semiconductor films.
6. (Currently Amended) Device according to Claim 1, characterized in that the intensity limiter [[(4)]] and the non-linear optical means [[(10)]] are placed on either side of the active gain medium [[(5)]].
7. (Currently Amended) Device according to Claim 1, characterized in that the intensity limiter [[(4)]] is placed between the non-linear optical means [[(10)]] and the active gain medium [[(5)]].
8. (Previously Presented) Device according to Claim 1, characterized in that the active gain medium is an Nd:YAG crystal.

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9. (Currently Amended) Device according to Claim 1, characterized in that the non-linear optical means [[(10)]] has a reflection coefficient of the radiation at the second harmonic [[(ω_2)]]
which is greater than the reflection coefficient of the radiation at the fundamental frequency
[[(ω_1)]].

10. (Currently Amended) Device for mode-locking a laser, in particular a laser of pulsed type, comprising a resonant cavity [[(20)]],

- delimited by a first mirror [[(1)]] and a second mirror [[(8)]],

- provided with an active laser gain medium [[(5)]] for amplifying a laser radiation beam at the fundamental frequency [[(ω_1)]], and

- a solid non-linear optical means [[(10)]] which comprises at least said second mirror [[(8)]], for reversible conversion of the radiation at the fundamental frequency [[(ω_1)]] into radiation at a harmonic frequency [[(ω_2)]], said non-linear optical means [[(10)]] having a reflection coefficient which increases as the intensity of the radiation at the fundamental frequency increases,

characterized in that said device is provided with an intensity limiter comprising a GaAs, CdSe or InP plate with a transmission coefficient which passively decreases as the intensity of the radiation at the fundamental frequency increases, so as to ensure, in combination with said non-linear optical means [[(10)]], both a positive feedback and a negative feedback on the quality factor of the resonant cavity [[(20)]].

11. (Currently Amended) Process for mode-locking a laser, in particular a laser of pulsed type, characterized in that it comprises:

- emitting a laser radiation beam at the fundamental frequency [[(ω_1)]] by stimulating an active laser medium [[(5)]],

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- converting the beam at the fundamental frequency $[(\omega_1)]$ into a beam at a harmonic frequency $[(\omega_2)]$,
- returning the beam at the harmonic frequency $[(\omega_2)]$ to the resonant cavity $[(20)]$,
- reconverting the beam at the harmonic frequency $[(\omega_2)]$ into a beam at the fundamental frequency $[(\omega_1)]$, and
- passively limiting the intensity of the beam at the fundamental frequency $[(\omega_1)]$ inside the resonant cavity $[(20)]$, by means of at least one GaAs, CdSe or InP plate.